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(21) International Application Number: PCT/NL93/00250 (22) International Filing Date: 25 November 1993 (25.11.93) (30) Priority Data: 9202096 2 December 1992 (02.12.92) NL (71) Applicant (for all designated States except US): DSM N.V. [NL/NL]; Het Overloon 1, NL-6411 TE Heerlen (NL). (72) Inventors; and (75) Inventors/Applicants (for US only): AAGAARD, Olav, Mar- cus [NL/NL]; De Rosenije 74 C, NL-6228 DH Maastricht (NL). VAN DIJK, Hans, Klaas [NL/NL]; Dassenkuillaan 96, NL-6162 JG Geleen (NL). HOEN, Nicolaas, Gerard, Marie [NL/NL]; Hugo de Grootstraat 1, NL-6181 BG Stein (NL). PUT, Jozef, Albert [BE/BE]; Keizelstraat 58, B-3590 Diepenbeek (BE). (74) Agent: GEERTS, Johanna, Adriana, Maria; Octrooibureau DSM, P.O. Box 9, NL-6160 MA Geleen (NL).		(81) Designated States: AU, BB, BG, BR, BY, CA, CZ, FI, HU, JP, KP, KR, KZ, LK, MG, MN, MW, NO, NZ, PL, RO, RU, SD, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: POLYMER COMPOSITION COMPRISING A POLYMER AND AT LEAST ONE RADIATION-SENSITIVE COMPONENT		
(57) Abstract <p>The invention relates to a polymer composition comprising a polymer and a radiation sensitive substance, which can be modified by means of irradiation in such a way that after the irradiation the part of the surface of the polymer composition that has been subjected to irradiation has a colour that differs from the colour of the surface that has not been irradiated. The polymer composition according to the invention is characterized in that the radiation sensitive substance absorbs radiation in the visible range, the near infrared region and/or the near ultraviolet region can be modified in different ways, so that on the surface of the polymer composition several, mutually different chromatic colours can be obtained. It has been found that the polymer composition according to the invention can be irradiated in a simple way such that on the surface several, mutually different, chromatically coloured markings can be obtained. It also appears that the texture of the surface of the polymer composition does not change to the eye as a result of the irradiation. In specific cases the gloss of the surface shows no or hardly any change at the place of the irradiation. After the irradiation the markings on the surface appear to be very heat, weather and light resistant under conditions of use. It further appears that the markings are wear and scratch resistant, corrosion resistant, dimensionally stable, free of deformation and well legible. Finally, the physical and mechanical properties of the polymer composition are hardly or not at all affected by the application of the marking.</p>		

CLAIMS

1. Polymer composition comprising a polymer and a radiation sensitive substance, which can be modified by means of irradiation in such a way that after the irradiation the part of the surface of the polymer composition that has been subjected to irradiation has a colour that differs from the colour of the surface, characterized in that the radiation sensitive substance absorbs radiation in the visible range, the near infra-red region and/or the near ultra-violet region, can be modified in different ways, so that on the surface of the polymer composition several, mutually different chromatic colours can be obtained.
2. Polymer composition according to claim 1, characterized in that the radiation sensitive substance comprises at least one radiation sensitive component which can be modified under at least two different irradiation conditions.
3. Polymer composition according to any one of claims 1-2, characterized in that the radiation sensitive substance contains at least two different radiation sensitive components.
4. Polymer composition according to any one of claims 1-3, characterized in that the radiation sensitive component is chosen from the group of organic and inorganic pigments, organic, inorganic and polymeric colorants, photochromic, thermochromic and prechromic compounds, coloured and uncoloured precursor colorants, coloured fillers, UV stabilizers, antioxidants, flame-retardants, acid formers, photooxidants and photoreductors.
5. Polymer composition according to any one of claims 1-4, characterized in that the radiation sensitive component is chosen from the group of aromatic condensation products of naphthalene and perylene, aniline and aniline derivatives, helianthrone

- compounds and lead sulphochromate molybdate.
6. Polymer composition according to any one of claims 1-5, characterized in that the polymer composition contains plate-shaped particles chosen from the group of natural pearl essence, lead carbonate, bismuth oxychloride, mica particles wholly or partly coated with metal oxide; graphite, copper phthalocyanine, titanium dioxide, and aluminium coated with iron oxide.
7. Polymer composition according to claim 6, characterized in that the plate-shaped particles are mica particles having a thickness of between 300 and 600 nm and a length of between 5 and 200 μm .
8. Polymer composition according to claim 6 or 7, characterized in that the plate-shaped particles are at least partly coated with a radiation sensitive component.
9. Polymer composition according to claim 8, characterized in that the radiation sensitive component contains TiO_2 and/or Fe_2O_3 .
10. Polymer composition according to any one of claims 1-9, characterized in that the radiation sensitive substance comprises one or more organic or inorganic pigments.
11. Polymer composition according to claim 10, characterized in that the organic or inorganic pigments are chosen from the group of azo pigments, azo colorants, metal complexes of azo compounds, Fe_2O_3 , dioxazine pigments and carbon black.
12. Polymer composition according to any one of claims 1-11, characterized in that the radiation sensitive substance comprises one or more non-colour-forming components which are colour forming after modification.
13. Polymer composition according to claim 12, characterized in that the non-colour-forming component is chosen from the group of dianthrylidene compounds, aromatic condensation products of

naphthalene and perylene, cyanine phthalides, fluorans and spiropyran compounds.

14. Polymer composition according to any one of claims 1-13, characterized in that the weight percentage of radiation sensitive substance in the polymer composition is 0.001-80, relative to the total weight of polymer and radiation sensitive substance.
15. Polymer composition according to any one of claims 1-14, characterized in that the polymer composition contains a radiation insensitive substance.
16. Polymer composition according to any one of claims 1-15, characterized in that the polymer is a thermoplastic polymer.
17. Polymer composition according to claim 16, characterized in that the thermoplastic polymer is chosen from the group of polyolefins, polyoxides, polyesters, polystyrene, acrylonitrile-butadiene-styrene, polyamide and polycarbonate.
18. Polymer composition according to any one of claims 1-17, characterized in that the polymer is a thermosetting polymer.
19. Polymer composition according to claim 18, characterized in that the thermosetting polymer is chosen from the group of alkyd resins, polyester resins, amino resins, phenol resins, polyurethane resins, epoxy resins, melamine-urethane-formaldehyde resins, urethane-formaldehyde resins, melamine resins and acrylate resins.
20. Process for marking a polymer composition according to any one of claims 1-19, characterized in that the surface of the polymer composition is irradiated in such a way that at least one of the radiation sensitive components in the polymer composition is wholly or partially modified and the surface of the polymer composition changes in colour at the place of the irradiation.
21. Process according to claim 20, characterized in that the surface of the polymer composition is irradiated

through a mask.

22. Process according to claim 20, characterized in that the surface of the polymer composition is irradiated with a writing radiation beam.
- 5 23. Process according to any one of claims 20-22, characterized in that the radiation load on the surface of the polymer composition is varied locally.
24. Process according to any one of claims 20-23, characterized in that the intensity of the radiation is varied locally.
- 10 25. Process according to any one of claims 20-24, characterized in that the surface of the polymer composition is irradiated sequentially with radiation of differing intensity.
- 15 26. Process according to any one of claims 20-25, characterized in that the wavelength of the radiation is varied locally.
27. Process according to any one of claims 20-26, characterized in that the surface of the polymer composition is irradiated sequentially with radiation of differing wavelength.
- 20 28. Process according to any one of claims 20-27, characterized in that at least one of the radiation sensitive components in the polymer composition is wholly or partially bleached during the irradiation.
- 25 29. Process according to claim 28, characterized in that the polymer composition is irradiated with such a radiation load that after the irradiation at least one of the radiation sensitive components shows no absorption any more in the visible range.
- 30 30. Process according to any one of claims 20-29, characterized in that the polymer composition is irradiated with such a radiation load that during the irradiation of the polymer composition the surface is foamed at the place of the irradiation.
- 35 31. Process according to any one of claims 20-30, characterized in that the polymer composition is irradiated with such a radiation load that at least

on of the radiation sensitive components is wholly or partially removed during the irradiation.

- 5 32. Process according to any one of claims 20-31, characterized in that the polymer composition is irradiated with such a radiation load that the surface of the polymer composition melts at the place of the irradiation.
33. Moulding comprising a polymer composition according to any one of claims 1-19.
- 10 34. Moulding having a surface that is provided with at least one marking which has a colour contrasting with the colour of the non-irradiated surface, which has been obtained by a process according to any one of claims 20-32.
- 15 35. Moulding according to claim 34, characterized in that the surface of the moulding has markings of at least two different colours which differ from the colour of the non-irradiated surface.
- 20 36. Moulding according to claim 34 or 35, characterized in that the depth of the marking is 0.1-1000 μm , measured from the surface of the moulding.
37. Article comprising a moulding according to any one of claims 33-36.